

Vortex Universal Stoichiometric Preburner (VUSP) for Liquid Rocket Engines

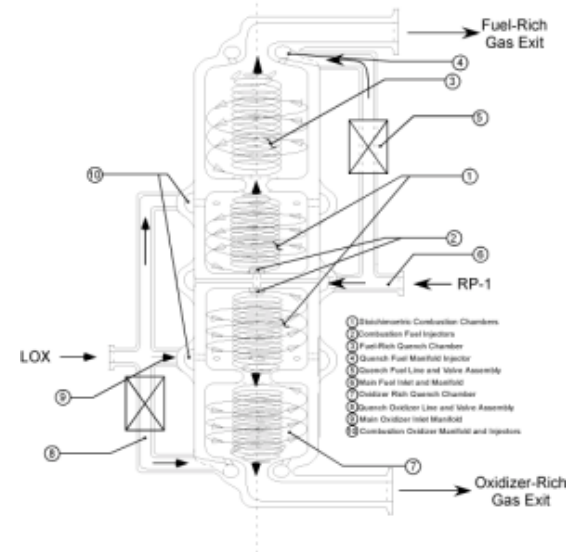
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 Proposal No.: 01-A5-01-9120

Description and Objectives

ORBITEC proposes to analyze, design and develop a new innovative preburner (gas generator) to drive the propellant turbopumps on liquid rocket engines. The gas generator is unique in that it operates at stoichiometric mixture ratio in the combustion process, using ORBITEC's vortex flow field to keep combustion products off the wall. The chamber walls remain cool. Either oxidizer or fuel is used to quench the combustion products to produce an oxidizer-rich, or fuel-rich product for turbine drive gas. This new gas producer is potentially better than current designs because it has less soot generation problems, can provide both drive gases (if needed) from a single unit and provides improved engine performance. Its cold wall feature offers lower weight, and longer life, while design simplicity assures lower cost compared to current preburners/gas generators.

OBJECTIVES are to:

1. Perform an applications study to define/select initial propellants and operating point for best future applications when development is complete. Define an appropriate subscale test article that will allow confident scale-up to prototype size in Phase II
2. Design, fabricate and assemble the test combustor and quench chamber in a configuration suitable for demonstrating both fuel-rich and oxidizer-rich gas generation.
3. Install and test the combustor to demonstrate the basic feasibility of the vortex combustion and downstream quench.
4. Provide a preliminary design of a Phase II prototype test article



Approach

- Task 1. Modify Existing Combustion Test Hardware
- Task 2. Test Combustor and Quench Section With GOX/Gaseous Hydrogen
- Task 3. Modify Combustion Test Hardware For Use With LOX/RP-1
- Task 4. LOX/RP-1 Test Operations Including Quench Section
- Task 5. Assessment and Recommendations, Including Preliminary Phase II Design
- Task 6 Reporting

Schedule and Deliverables

6 Months
 Final Report

Subcontractors/Partners

None.

NASA & Commercial Applications